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some time before a demand could be had for them in the unprepared state there, whereas in the mode proposed, it is supposed the sale would be readily procured.

On the manner in which Clouds are formed, and Rain caused by the discharge of the Electrical fire in Lightning; with some Remarks on Medical Electricity; by M. Cornelius Varley.

Phil. Mag. vol. 34. p. 161.

Mr. Varley observing it to lighten one evening frequently, without hearing thunder, went into the fields to see it more distinctly, and perceived the horizon towards the Northward lined with clouds, while there were none overhead except a few small ones, proceeding towards the lower clouds, which they soon after joined, which proves that they were on a level with it, and that a diminution was taking place in the volume of the atmosphere; for otherwise they could not have overtaken the large cloud, being too far from it to be affected by electrical attraction. At first it lightened in various parts of the mass of clouds, but more frequently in one place. Soon after this the clouds became united in one, and the place of the lightning became stationary; and then the following effect took place, which seemed distinctly to show in what manner the electrical fluid is conducted from the upper regions to the earth.

At first a small round cloud appeared behind the long dark cloud and partly above it. In this cloud it frequently lightened, and just after the light was extinguished, the electric sparks struck to the earth from the under surface of the long black cloud. This double transmission was many times repeated, till at length the lower cloud ceased to give sparks to the earth, at the spot immediately under the higher cloud, though it was still distinctly receiving them from it. I then found, observes the author, by casting my eye along the lower cloud, that every charge from the upper one travelled about four miles westward along the lower cloud, and then darted to the earth. I knew it travelled in this manner,

by frequently seeing it jump over one, and sometimes over two chasms in the lower cloud, in its passage to the western end. The time it took to travel the length above-mentioned, was while I could count 20 or 30, but twice I counted 60 before it struck the earth. During the time of these observations, the higher cloud which supplied so much electricity, was not diminished in the least. On the contrary, it continued to enlarge in its dimensions, and chiefly towards the wind.

Now the quantity of electricity supplied by this cloud, continually during an hour, was probably fifty times as much, as it could possibly contain. The question then is; where did it come from? The increasing of the cloud furnishes an answer to this question; for it could not increase, without the addition of vapour, and that addition could only come from the atmosphere. This was proved by the manner and place of increase, which was at the top, and at the most prominent parts, facing the wind. The vapour, being transparent had the highest charge of electricity. The upper cloud (though positive to the under) was minus to that vapour, and silently attracting from it the superabundant electricity, which it gave off visibly to the under cloud, which was still less charged, and which was kept so by the earth (which may be considered as quite negative) immediately drawing away that charge in sparks.

Now it is evident by this progress of the electric fluid to the earth, that the electrified vapour must have been condensed to the smaller compass of the cloud, and have been deposited on its surface, occasioning that very great increase of cloud — This seems to show that a storm of lightning will always occasion a current of wind from the external regions towards itself; and hence arises the dead calm preceding a storm, and the fall of the barometer, as this is the focus of condensation.

I have frequently since, in stormy weather, seen clouds, under this effect of increase, sometimes increasing at one end, and diminishing at the other, by slow rain, when near a

mountain; but I have seldom seen the theoretic form (if I may be allowed the expression) so evident (except among mountains, where it is unlimited, but the lightning is rarely seen) as in the case I have stated; nor can this conformation be ever seen, but when the barometer is low or falling.

In a second paper, in the same number Mr. Varley thus describes another thunder storm, which is deserving of notice:

Towards the end of a fine day, the air grew thick with vapour, but exhibited no visible form of clouds. This vapour afterwards condensed into thicker masses, with faint flashes of lightning about them. The condensation then went on very rapidly, so that what was only a thick mist before, became in an hour, a large general mass of clouds; and I could now see clear sky in different parts, though at the commencement, the whole sky was covered with a faint mist. There was now a great deal of lightning between the upper and lower clouds, the effect of which was seen through the under clouds, in broad misty zig-zag flashes; and nearer the horizon were seen large sparks running along between the clouds to a great distance; the passage of the light was visible all the way, but the spark was seen distinctly at all the openings.

During the time this lightning continued, there was only now and then a little thunder, which I think is accounted for by an accompanying effect; namely, the condensation of a very rare cloud into one more dense, but yet quite elastic. The condensation may be conceived to take place by the closing together of an immense number of small parcels of clouds, as if the parts of a sponge were made to approach by pressure, and therefore with a very soft and gentle motion.

But when a spark strikes from the lowest cloud to the earth, the condensation must be into rain (for there is no intermediate state between that cloud which is already at its lowest density and rain) therefore the atmosphere has to collapse upon solid inelastic particles of rain, which must produce a

sharp clap, and this every person knows to be the effect, when lightning strikes down from over our heads.

During all the day the wind had been south-west, but when the storm commenced, the wind ceased on the north-east side of it, and seemed afterwards to return; for after every large flash of lightning, I felt an evident current of wind blowing towards the focus of condensation, which had settled considerably to the westward of me.

I did not see many sparks strike to the earth, but there were distant showers of rain, and it thundered and rained very hard in the night.

The principal matter worthy of notice in Mr. Varley's observations on medical electricity, is the proposal of a mode of making the electrical fire operate all over the body of the patient at once, by placing him in contact with the conductor, while insulated, in a damp atmosphere, which may be easily produced by using a pan of boiling water; but in this case the machine, that it may be kept dry, should be in another room, and the conductor should pass, insulated, through the wall, to the patient.

Remarks. The great part which electricity is now known to act in all natural phenomena, since the late discoveries of its wonderful effects in chemistry, renders all facts respecting it interesting, especially when observed with the precision the above have been. One of Mr. Davy's last theories gives reason to suppose that the air itself of the atmosphere is only water modified in a peculiar manner by electrical agency, and that on the electricity being withdrawn, the air returns again to water; but in either theory the facts related are of importance.

Mr. Varley is not quite accurate in asserting that the small clouds could not have overtaken the large cloud, but by a diminution of the volume of the atmosphere; for they might also be brought towards it by the current of air which is produced by the falling of the rain, acting in the same manner as the fall of water does in the engine called the water-blast, which would cause one current

of air towards the raining cloud above, and another from it beneath at the surface of the globe; which latter is often observed by mariners, in those squalls which accompany detached showers falling in their vicinity.

The great effect which the abstraction of the electric fire from the air is now proved to have in causing rain to descend, makes the opinion of some philosophers more probable, that means will be yet discovered for producing this precipitation artificially; which considered impartially is not a greater exertion of human intellect, than the securing buildings from the stroke of lightning, by conductors. If ever this discovery takes place in a form sufficiently cheap and practicable for use, it may produce the greatest and most beneficial effects for the benefit of mankind in various parts of the earth, covering with plenty those arid regions which are now useless from incessant drought; and, what perhaps is of more consequence, diminishing the sum of human misery caused by temporary droughts in those countries where rain is usual.

It is probable that large electrical kites, with air balloons attached to them, to make them ascend higher, would have some effect in this way, especially when sent up from the tops of lofty hills. That the importance of the benefit in view would render the experiment worth trial, cannot be denied: it would at least be a more rational application of the balloon than what has of late years been made of it; as in general it has only been applied to gratify the curiosity of some individuals, as to the sensation the ascent would cause; which seems not to have been very agreeable, as they have been on most occasions in as great a hurry to descend to the ground from the higher regions, as they have been eager at first to rise to them.

Account of the Use of the Oxymuriatic Gas in the Fumigating Army Hospitals. In a letter from M. Chaméron to M. Guyton.

Annales de Chimie, tom. 64. p. 172.

Posen, Aug. 18, 1807.

M. Desgenettes, the physician general to the army, gave me the follow-

ing instructions: "I request that when the hospitals are crowded, or when low fevers prevail, you may use the fumigations with the hyper-oxygenated muriatic acid, according to M. Morveau's process. This valuable preventative has been very improperly rejected, and has been thought useful only when contagious diseases were completely developed. I request you to inform me when this purifying remedy is put in practice."

In consequence of this letter, I constantly recommended these fumigations in the wards of the hospitals to which I was attached. The instructions for health inserted in the last Pharmaceutical formula, for the use of military hospitals, seem to make this measure subordinate to the removal of the patients from the infected place, and successively changing their beds from room to room. Circumstances, however, may occur to prevent these measures from being adopted, and it is important to simplify the operation as much as possible. Without occasioning, therefore, any removal of the patients, the hyper-oxygenated muriatic gas may be used morning and evening without inconvenience. An attendant may carry backward and forward an earthen vessel containing some muriat of soda and manganese, and cold sulphuric acid, taking care to stir it frequently with a spatula.

Neither the attendants nor the patients have ever suffered any bad effects, in my presence, from the pungency of the fumigation. Some windows may, however, be opened, to give vent to the fumigation, but if the weather be cold this may be dispensed with; and the influence of the fumigation partly depends upon its being some time confined within a close place.

An accident happened lately in a military hospital, where perfect salubrity had previously reigned: a church, which had been converted into a fine ward, with sixty beds for chronic diseases, was infected with a foetid smell, which exhaled from the ground, on account of a vast burying vault having been overflowed by the bursting into it of a cess-pool. The sick and wounded were instantly re-